

Base 12 may include feet 88 to provide firm support for the apparatus on a flat level surface. The feet 88 may be formed as suction pads to provide resistance against movement of the apparatus during operation.

An adjustment screw 90 provides for fine adjustment of the centering of pump mechanisms 38 relative to the test tube closures 28 as follows. Adjustment screw 90 functions as a stop or abutment which limits the sliding movement of the test tube holder assembly toward the vertical frame member 16. Thus by adjusting screw 90 inwardly or outwardly, the abutment or stop position of the test tube holder is adjusted to be aligned under the pump mechanisms. Adjustment screw 42 is adjusted to provide a good positive detent against notches 48 in alignment members 46.

Numerous screws and bolts hold the various parts of the apparatus together as clearly shown and their description is not necessary for a full understanding of the invention.

The operation of the present invention will be further explained. The apparatus should first be firmly positioned on a flat level surface. The handle 56 is then raised to its uppermost position. The test tube holder assembly 20 is engaged onto the slide bar 18 in base 12 with the desired test tube holes 76 or 78 positioned on the side of holder assembly 20 away from the vertical frame member 16. In the illustrated embodiment, up to three test tubes 26 with closures 28 may be inserted into the desired holes 76 or 78 so that up to three pump mechanisms 38 may be simultaneously inserted.

After the test tube holder assembly 20 is engaged and positioned against the vertical frame member 16, the test tubes 26 including closures 28 are inserted into the desired test tube holes. One or more pump mechanisms 38 may be placed as shown by arrow 92 into pump support assembly 34 with needles 40 extending into a styrofoam block 94 which provides a convenient and safe means of handling pump mechanisms 38 to place them in pump support assembly 34. After the pump mechanisms 38 are in place, the styrofoam block 94 is removed, exposing the needles 40, and with the test tube holder assembly 20 containing sealed test tubes 26 in position at a first station 36, handle 56 is then pulled down fully, putting pressure on the pump support assembly 34 and thereby pushing the needles 40 of pump mechanisms 38 through the test tube closures 28.

After the insertion is completed, handle 56 is pulled up until the insertion mechanism adjustment screw 42 moves into a first detent position in notch 48 where the pump support assembly 34 has moved up some distance, thus releasing the pressure on the tubes 26 and closures 28. Now the test tube holder assembly 20 may be gently pulled forwardly, in a direction away from vertical frame member 16, to disengage the now attached pump mechanisms 38 from pump support assembly 34. The test tubes 26 and closures 28, with pump mechanisms 38 attached, can now be removed from holder assembly 20. Alternately, the test tube holder assembly 20 can be removed from slide bar 18, turned 180 degrees and remounted on slide bar 18, in order to attach pump mechanisms to any test tubes in the second row of holes.

The foregoing is a complete description of a preferred embodiment of the present invention. Numerous changes, modifications and improvements may be made without departing from the spirit and scope of the present invention. The present invention, therefore, should be limited only by the following claims.

What is claimed is:

1. A manually operated apparatus for attaching pump mechanisms to sealed test tubes, each test tube sealed by a resilient, puncturable closure, comprising:

- a frame including a base;
- support means attached to said frame for releasably supporting one or more pump mechanisms;
- means for releasably holding at least one test tube, said holding means movably engaging and being displaceable on the base of said frame into position in alignment with the support means; and
- manually operated insertion means, attached to said frame, for displacing said support means and the pump mechanisms supported thereon towards said holding means and test tubes held therein, wherein said support means holds said pump mechanisms to thereby puncture the closures of the test tubes with said pump mechanisms upon operation of said insertion means.

2. The apparatus of claim 1, wherein said insertion means comprises a handle, said handle movably attached at one end thereof to said frame; and

- wherein said support means comprises a pressure bar coupled to said handle, said pressure bar applying pressure via the pump mechanisms to the closures of the test tubes when said pressure bar is displaced by moving said handle thereby causing the pump mechanisms to puncture the closures of the test tubes.

3. The apparatus of claim 1, wherein said base includes a slide bar which slidably engages the holding means for positioning said holding means in alignment with said support means.

4. The apparatus of claim 3, wherein said holding means is removeable from said slide bar.

5. The apparatus of claim 1, wherein said support means includes means for adjusting alignment of said support means so that pump mechanisms held therein are centered relative to the closures of test tubes when said holding means is positioned in alignment with said support means.

6. The apparatus of claim 2, wherein said insertion means further comprises detent means for defining at least one preset position of said handle.

7. A method of using the apparatus of claim 1, comprising the steps of:

- placing at least one test tube having closures into the holding means;
- displacing the holding means into alignment with the support means;
- placing one or more pump mechanisms in said support means; and
- manually activating the insertion means to puncture the closures with pump mechanisms.

8. The method of claim 7, further comprising: displacing the holding means away from the support means after puncture of the closures; and removing the test tubes from the holding means.

9. The method of claim 7, wherein the insertion means includes a handle and the step of manually activating comprises pulling the handle.

10. The apparatus of claim 1, wherein the holding means comprises means for adapting the holding means to accommodate test tubes of different lengths and diameters.

11. A manually operated apparatus for inserting pump mechanisms into test tube closures, comprising: a frame including a rectangular base having a plurality of feet and including a slide bar attached to a